

REMARKS

This Amendment is filed in response to the Final Office Action mailed on February 6, 2008, and is herewith filed a Request For Continuing Examination. All objections and rejections are respectfully traversed.

Claims 6-9, 11-17, 19-20, and 23-55 are currently pending.

Request for Interview

The Applicant respectfully requests a telephonic interview with the Examiner after the Examiner has had an opportunity to consider this Amendment, but before the issuance of the next Office Action. The Applicant may be reached at 617-951-3067.

Claim Rejections – 35 USC §102

At paragraphs 3-5 of the Office Action, claims 6-8, 12-17, 19, 27, 42-43, and 49-55 were rejected under 35 U.S.C. §102 as being anticipated over Nishanov et al., US Patent Application Publication No. 2003/006782, hereinafter Nishanov.

The present invention, as set forth in representative claim 6, comprises in part:

6. A method of claiming ownership of a plurality of disks by a network device of a plurality of network devices in a network storage system, comprising:

writing ownership information to a predetermined area of each disk, wherein the predetermined area of the disk is sector 0 on the disk and the ownership information stored in sector 0 is definitive ownership data for determining ownership of the disk;

setting a small computer system interface (SCSI) reservation tag for each disk to a state of network device ownership to provide a two part indicia of ownership for each disk, where the two part indicia of ownership are both written to each disk;

creating a table on each network device in the network storage system;

identifying all disks owned by each network device using ownership information written to the predetermined area of each disk of the plurality of disks and, for each identified disk, if a mismatch occurs between the ownership information on the predetermined area of the disk and the ownership defined by the SCSI reservation tag, then using the ownership information written to the predetermined area of the disk as definite ownership data; and

in response to identifying, storing entries in the table, wherein each entry identifies an owned disk of the network device storing the table.

By way of background, Nishanov discloses a system for protecting a node's exclusive access to a storage device. Each node is assigned an initiator ID and the initiator ID is mapped to a reservation key in a key table, wherein the reservation key table is stored on each disk. The reservation key includes three fields, which are a version, ReserveID field, and an OwnerID field. Each reservation key is mapped to a reservation type in a reservation table, wherein the reservation table is stored on each disk. The reservation type is configured with a persistent reservation. Each storage device is always registered. When a challenge occurs for ownership of the storage device, a new node writes ownership information to the ReserveID field. The owner then has time to win the challenge by writing its ownership information in the ReserveID field. If the owner writes its ownership information to the ReserveID field before the time is up, then the new node (challenger) loses the challenge. If the owner does not write its ownership information to the ReserveID field before the time is up, then the new node wins the challenge and the new node writes its ownership information into the OwnerID field.

Applicant respectfully urges that Nishanov does not disclose Applicant's claim novel *writing ownership information to a predetermined area of each disk, wherein the predetermined area of the disk is sector 0 on the disk and the ownership information stored in sector 0 is definitive ownership data for determining ownership of the disk, ..., creating a table on each network device in the network storage system, ..., in response to identifying, storing entries in the table, wherein each entry identifies an owned disk of the network device storing the table.* In further detail, Applicant's claimed invention uses two part ownership identification method. The first part of this ownership method is writing ownership information to a predetermined area of each disk. Within the system, ownership information written to the predetermined area of each disk is the definitive ownership attribute. This predetermined area of the disk can be any known and constant location on each of the disks and is usually sector 0 on each disk. The second part of the ownership method is setting of a SCSI reservation to allow only the disk owner to write to the disk. This use of a SCSI reservation allows other servers to read the ownership information from the disks. Furthermore, the SCSI reservation does not require storing read-only access permission for each network device because each network device not owning the disk can already read the disk. Additionally, the ability to change the SCSI reservation tag to match the ownership information stored in the predetermined area of disk allows a storage server to configure the disks into the appropriate RAID groups and or volumes. The ownership information stored on the storage device (sector 0) is the controlling ownership information on the disk. When a mismatch occurs between the ownership information stored in the predetermined sector and the SCSI reservation, the SCSI reservation is changed to show the same owner that is in the predetermined sector of the disk. Furthermore, each network device stores a table listing the different disks that a particular network device owns.

In summary, Applicant's invention, stores ownership information in a predetermined sector and persistent reservation on disk. Also, each network device stores entries in a table on the network device, where each entry identifies each disk that the network device owns.

In contrast, Nishanov discloses a reservation key table and reservation table stored on each disk. Applicant's invention stores the ownership table on each network device, and each network device only stores entries pertaining to the disks that it owns.

Furthermore, Nishanov uses a persistent reservation command to reserve access to a disk. There is no disclosure in Nishanov of storing information in a predetermined area, specifically sector 0, on a disk. Nishanov merely discloses storing the persistent reservations in a table on the disk (Nishanov, [0039]). Also, Nishanov uses a persistent reservation for storing owner reservation and challenge reservations. There is no predetermined location for storing definitive ownership information in Nishaov. Nishanov only uses a ReserveID field, and an OwnerID field, in a table on each disk, where the OwnerID field identifies the owning disk. The reserve field is stored based on reserve commands in Nishanov and new data is stored in the Owner field when a challenge is won. Accordingly, there is no disclosure of storing definitive ownership information in a predetermined sector in Nishanov.

Additionally, Nishanov requires listing every type of reservation for a disk in the reservation table. Applicant's invention allows read only access without storing written permission on each disk because of the two indices of ownership.

Accordingly, Applicant respectfully urges that Nishanov is legally insufficient to anticipate the present claims under 35 U.S.C. §102 because of the absence of the Applicant's claimed novel *writing ownership information to a predetermined area of each*

disk, wherein the predetermined area of the disk is sector 0 on the disk and the ownership information stored in sector 0 is definitive ownership data for determining ownership of the disk, ..., creating a table on each network device in the network storage system, ..., in response to identifying, storing entries in the table, wherein each entry identifies an owned disk of the network device storing the table.

Claim Rejections – 35 USC § 103

At paragraphs 5-7 of the Office Action, claims 20, and 23-25 were rejected under 35 U.S.C. §103 as being unpatentable over Nishanov, in view of Carlson et al., US Patent Application Publication No. 2003/0093501, hereinafter Carlson.

The present invention, as set forth in representative claim 20, comprises in part:

20. A network storage system comprising:

one or more switches interconnected to form a switching fabric;

a plurality of disks, each of the disks connected to at least one of the switches, ***each disk storing a first ownership attribute to a predetermined area of a disk*** and each disk associated with a second ownership attribute in the form of a small computer system interface reservation, ***wherein the predetermined area of the disk stores definitive ownership data for determining ownership of the disk and the small computer system interface reservation allows other network devices to read the ownership attribute from the disks***; and

one or more network devices, interconnected with the switching fabric, each of the network devices being configured to own a predetermined set of disks of the plurality of disks through use of the first and second ownership attributes, wherein each network device identifies all disks owned by the network device using ownership information written to the predetermined area of each disk of the plurality of disks and, for each identified disk, if a mismatch occurs between the ownership information on the predetermined area of the disk and the ownership defined by the SCSI reservation tag, then using the ownership information written to the predetermined area of the disk as definite ownership data and ***each network de-***

vice is configured with a table and to store entries in a table, wherein each entry identifies an owned disk of the network device storing the table.

By way of background, Carlson discloses a Storage Area Network (SAN) where storage devices are interconnected by switches to form a fabric. *See* paragraph 0039.

Applicant respectfully urges that Nishanov and Carlson taken alone or in combination do not teach or suggest Applicant's claimed novel *each disk storing a first ownership attribute to a predetermined area of a disk ...wherein the predetermined area of the disk stores definitive ownership data for determining ownership of the disk and the small computer system interface reservation allows other network devices to read the ownership attribute from the disks, ..., each network device is configured with a table and to store entries in a table, wherein each entry identifies an owned disk of the network device storing the table.* As stated above, Applicant's invention, stores ownership information in a predetermined sector and persistent reservation on disk. Also, each network device stores entries in a table on the network device, where each entry identifies each disk that the network device owns.

In contrast, Nishanov discloses a reservation key table and reservation table stored on each disk. Applicant's invention stores the ownership table on each network device, and each network device only stores entries pertaining to the disks that it owns.

Furthermore, Nishanov uses a persistent reservation command to reserve access to a disk. There is no disclosure in Nishanov of storing information in a predetermined area, specifically sector 0, on a disk. Nishanov merely discloses storing the persistent reservations in a table on the disk (Nishanov, [0039]). Also, Nishanov uses a persistent reservation for storing owner reservation and challenge reservations. There is no prede-

terminated location for storing definitive ownership information in Nishaov. Nishanov only uses a ReserveID field, and an OwnerID field, in a table on each disk, where the OwnerID field identifies the owning disk. The reserve field is stored based on reserve commands in Nishanov and new data is stored in the Owner field when a challenge is won. Accordingly, there is no disclosure of storing definitive ownership information in a predetermined sector in Nishanov.

Additionally, Nishanov requires listing every type of reservation for a disk in the reservation table. Applicant's invention allows read only access without storing written permission on each disk because of the two indices of ownership.

Additionally, Carlson does not disclose nor suggest storing an ownership table on each network device only storing the disks that are owned by that particular network device. Additionally, Carlson does not disclose or suggest storing definitive ownership information in a predetermined sector on each disk.

Accordingly, Applicant respectfully urges that the combination of Nishanov and Carlson is legally insufficient to make obvious the present claims under 35 U.S.C. §103 because of the absence of the Applicant's claimed novel *each disk storing a first ownership attribute to a predetermined area of a disk ...wherein the predetermined area of the disk stores definitive ownership data for determining ownership of the disk and the small computer system interface reservation allows other network devices to read the ownership attribute from the disks, ..., each network device is configured with a table and to store entries in a table, wherein each entry identifies an owned disk of the network device storing the table.*

At paragraph 8, of the Office Action, claim 26 was rejected under 35 U.S.C. §103 as being unpatentable over Nishanov, in view of Carlson, and in further view of Jaskiewicz et al., US Patent Application Publication 2003/0061491, hereinafter Jaskiewicz.

Applicant respectfully notes that claim 26 is a dependent claim that depends from an independent claim which is believed to be in condition for allowance. Accordingly, claim 26 is believed to be in condition for allowance.

At paragraphs 9 of the Office Action, claims 28-42 and 45-48 were rejected under 35 U.S.C. §103 as being unpatentable over Brunelle et al., US Patent No. 6,654,902, issued on Nov. 25, 2003, hereinafter Brunelle, in view of Nishanov.

The present invention, as set forth in representative claim 28, comprises in part:

28. A method for a network device to manage ownership of one or more storage devices in a network storage system, comprising:

reading ownership information from a predetermined area of each storage device, wherein the predetermined area of each storage device is sector 0 on the disk and the ownership information stored in sector 0 is definitive ownership data for determining ownership of the storage device;

in response to reading the ownership information, creating an ownership table that stores entries where each entry identifies a storage device owned by the network device, wherein the ownership is stored within the network device;

reading a small computer system interface (SCSI) reservation tag from each storage device, wherein the SCSI reservation tag allows other network devices to read the ownership information from each storage device;

comparing the SCSI reservation tag to the ownership information of the same storage device and, if there is not a match, changing the SCSI reservation tag to match the ownership information; and
configuring the one or more storage devices identified in the ownership table into at least one volume for use by the network device.

By way of background, Brunelle discloses a way of using standard small computer system interface (SCSI) persistent reservations with I/O barriers. The American National Standards Institute (ANSI) has standardized a number of SCSI Persistent Reservation commands, such as *Persistent Reserve Out*. See col. 1, lines 28-41. Brunelle describes issuing two of these commands to assign ownership to storage devices. See col. 5, lines 60-67. The first *Persistent Reserve Out* command includes a key describing a particular node owning the device. See col. 6, lines 38-48. The second *Persistent Reserve Out* command includes a parameter specifying an access type, such as “write exclusive read only.” See col. 5, lines 65-67 and col. 6, lines 48-54. Additionally, Brunelle describes writing registration information each time a node is initialized or changed.

Applicant respectfully urges that Brunelle and Nishanov, taken alone or in combination, do not teach or suggest Applicant’s claimed novel ***reading ownership information from a predetermined area of each storage device, wherein the predetermined area of each storage device is sector 0 on the disk and the ownership information stored in sector 0 is definitive ownership data for determining ownership of the storage device, in response to reading the ownership information, creating an ownership table that stores entries where each entry identifies a storage device owned by the network device, wherein the ownership is stored within the network device.*** As stated above, Applicant’s invention, stores ownership information in a predetermined sector and persis-

tent reservation on disk. Also, each network device stores entries in a table on the network device, where each entry identifies each disk that the network device owns.

In contrast, Nishanov discloses a reservation key table and reservation table stored on each disk. Applicant's invention stores the ownership table on each network device, and each network device only stores entries pertaining to the disks that it owns.

Furthermore, Nishanov uses a persistent reservation command to reserve access to a disk. There is no disclosure in Nishanov of storing information in a predetermined area, specifically sector 0, on a disk. Nishanov merely discloses storing the persistent reservations in a table on the disk (Nishanov, [0039]). Also, Nishanov uses a persistent reservation for storing owner reservation and challenge reservations. There is no predetermined location for storing definitive ownership information in Nishaov. Nishanov only uses a ReserveID field, and an OwnerID field, in a table on each disk, where the OwnerID field identifies the owning disk. The reserve field is stored based on reserve commands in Nishanov and new data is stored in the Owner field when a challenge is won. Accordingly, there is no disclosure of storing definitive ownership information in a predetermined sector in Nishanov.

Additionally, Nishanov requires listing every type of reservation for a disk in the reservation table. Applicant's invention allows read only access without storing written permission on each disk because of the two indices of ownership.

Additionally, Brunelle does not disclose nor suggest storing an ownership table on each network device only storing the disks that are owned by that particular network device. Additionally, Brunelle does not disclose or suggest storing definitive ownership information in a predetermined sector on each disk.

Accordingly, Applicant respectfully urges that the combination of Nishanov and Brunelle is legally insufficient to make obvious the present claims under 35 U.S.C. §103 because of the absence of the Applicant's claimed novel *reading ownership information from a predetermined area of each storage device, wherein the predetermined area of each storage device is sector 0 on the disk and the ownership information stored in sector 0 is definitive ownership data for determining ownership of the storage device, in response to reading the ownership information, creating an ownership table that stores entries where each entry identifies a storage device owned by the network device, wherein the ownership is stored within the network device.*

All independent claims are believed to be in condition for allowance.

All dependent claims are believed to be dependent from allowable independent claims.

The Applicant respectfully solicits favorable action.

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